

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions of claims in the application:

Listing of Claims:

1. (Currently Amended) A system ~~embodied at least in part on computer-readable media~~ that renders data in an industrial automation environment, comprising:

a processor;

a memory communicatively coupled to the processor, the memory having stored therein computer-executable instructions configured to implement the system including:

a device analyzer that determines properties, limitations, or software plug-ins associated with a plurality of devices intended for delivery of data;

a Human Machine Interface (HMI) generator that generates code or data for the HMI in accordance with the determined properties of the devices, and delivers the code or data to the respective devices;

a communications component that maps data path information to data delivered to one of the devices to enable communication between the data and the HMI; and

a processing component that ~~creates~~ renders one or more multi-dimensional software objects ~~that renders data~~ based at least in part on the properties, limitations, software plug-ins of the device, or any combination thereof.

2. (Previously Presented) The system of claim 1, the device analyzer further comprising a memory or a processor.

3. (Previously Presented) The system of claim 2, the processor utilizes artificial intelligence to render the data.

4. (Previously Presented) The system of claim 3, the processor employs artificial intelligence in connection with manipulating a mapping.

5. (Previously Presented) The system of claim 1, the HMI generator automatically modifies the code or data associated with an existing HMI for display on a new device for which the existing HMI is not configured, the code or data is modified according to the determined properties of the new device.
6. (Previously Presented) The system of claim 1, employed in a processing environment including at least one of a personal computer, a desktop computer, a laptop computer, a personal digital assistant, a hand-held computer, a cell phone, a tablet computer, or any combination thereof.
7. (Previously Presented) The system of claim 1, the device coupled to the HMI generator is least one of a display, a data store, a server, or any combination thereof.
8. (Previously Presented) The system of claim 1, the HMI generator further comprising:
an input component that obtains a common data input for the multi-dimensional software objects.
9. (Previously Presented) The system of claim 8, the multi-dimensional software object is assigned specific data.
10. (Previously Presented) The system of claim 9, the specific data varies at least one of size, color, translational location, rotation of a software object, text, audio, video, visibility, enable or disable state, object state, object type, object text, trending zoom level, audio volume, specification of audio clips, specification of video clips, starting, stopping animation, or any combination thereof.
11. (Previously Presented) The system of claim 8, a change to the common data input affects the multi-dimensional software objects.

12. (Previously Presented) The system of claim 1, the HMI generator further comprising:
a correlation component that associates one or more software objects with one or more physical devices; and
an object generation component that builds software objects associated with data corresponding to the physical devices, the physical devices affecting changes to the software objects and the software objects affecting changes to the physical devices.
13. (Previously Presented) The system of claim 12, the software objects are imported from an outside source.
14. (Previously Presented) The system of claim 12, further comprising an interface that selects data to associate with the physical devices.
15. (Previously Presented) The system of claim 12, further comprising an interface that selects specific attributes of software objects corresponding to data associated with the physical devices.
16. (Previously Presented) The system of claim 1, the processing component renders data based at least in part on a user access data level, a data type, a data state that employs the processing component in an HMI residing in a processing environment, or any combination thereof.
17. (Previously Presented) The system of claim 16, further comprising a user-based association between displayed data and at least one of a user access level, a data type, a data state, or any combination thereof.

18. (Currently Amended) A system ~~embodied at least in part on computer readable media~~ that renders data in an industrial automation environment comprising:

a processor;

a memory communicatively coupled to the processor, the memory having stored therein computer-executable instructions configured to implement the system including:

a device analyzer that determines properties, limitations, or software plug-ins associated with a plurality of devices intended for delivery of data;

an identification component that determines if a format or a sub-format of data is known to the system;

an artificial intelligence component that determines the format of unknown data received by a Human Machine Interface (HMI);

a communications component that maps data path information to data delivered to one of the devices to enable communication between the data and the HMI; and

a processing component that creates one or more multi-dimensional software objects from the data in the HMI ~~into a~~ based at least in part on a suitable format, wherein the suitable format is based at least in part on the properties, limitations, or software plug-ins of the device.

19. (Previously Presented) The system of claim 18, the artificial intelligence component locates and renders a partial data set.

20. (Previously Presented) The system of claim 18, further comprising a memory which stores previously unknown data types for comparison with future data.

21. (Previously Presented) The system of claim 18, the HMI renders the data into at least one of text, audio, video, static images, interactive images, or any combination thereof.

22. (Previously Presented) The system of claim 18, the processing component provides an error message when data cannot be rendered.

23. (Previously Presented) The system of claim 18, the processing component further renders data into suitable formats or sub-formats compatible with display capabilities of a device on which the data is to be presented.

24. (Currently Amended) A method ~~performed at least in part by computer hardware~~ to display data based at least in part on a zoom level, comprising:

employing a processor executing computer executable instructions stored on a computer readable storage medium to implement the following acts:

determining properties, limitations, or software plug-ins associated with a plurality of devices intended for delivery of data;

converting 3-dimensional data into 2-dimensional data or vice versa based at least in part on properties, limitations, software plug-ins of the device, or any combination thereof;

displaying the data in a plurality of disparate views; and

presenting views associated with a corresponding zoom level.

25. (Previously Presented) The method of claim 24, further comprising:

presenting data associated with a zoom level chosen by the user; and

suppressing data associated with the zoom level chosen by the user.

26. (Previously Presented) The method of claim 24, further comprising assigning the data or the zoom levels.

27. (Previously Presented) The method of claim 24, further comprising associating the zoom level and the data in a non-linear relationship.

28. (Previously Presented) The method of claim 24, further comprising utilizing artificial intelligence to infer a default zoom level based on a user preference.

29. (Currently Amended) A system ~~embodied at least in part on computer readable media~~ that recognizes or creates a software object representing a physical device, comprising:

a processor;

a memory communicatively coupled to the processor, the memory having stored therein computer-executable instructions configured to implement the system including:

a software object generator that determines properties, limitations, or software plug-ins associated with a plurality of physical devices intended for creation of the software objects;

a Human Machine Interface (HMI) generator that formats data according to a multi-dimensional object structure based at least in part on the properties, limitations, or software plug-ins of the physical devices; and

a communications component that maps data path information to the formatted data to enable communication between the formatted data for the physical device and the HMI.

30. (Previously Presented) The system of claim 29, further comprising an artificial intelligence component that recognizes a new device added to the system.

31. (Previously Presented) The system of claim 29, further comprising an identification component that recognizes substantially all the components coupled to the system.

32. (Previously Presented) The system of claim 29, further comprising a mapping component that provides connectivity to the physical devices.

33. (Currently Amended) A method ~~performed at least in part by computer hardware~~ for rendering data in an industrial automation environment, comprising:

employing a processor executing computer executable instructions stored on a computer readable storage medium to implement the following acts:

determining formatting requirements, properties, limitations, multi-level hierarchical attributes, or software plug-ins associated with a plurality of devices intended for delivery of data;

formatting the data based at least in part on the properties, limitations, multi-level hierarchical attributes, or software plug-ins of the devices; and

delivering the formatted data to the respective devices by mapping data path information to the delivered data to enable communication between the formatted data and a Human Machine Interface (HMI).

34. (Previously Presented) The method of claim 33, further comprising reformatting data associated with an existing Human Machine Interface (HMI) for delivery to a newly detected device based at least in part on the determined formatting requirements of the newly detected device.

35. (Currently Amended) A method ~~performed at least in part by computer hardware~~ for rendering data in an industrial automation environment, comprising:

employing a processor executing computer executable instructions stored on a computer readable storage medium to implement the following acts:

- receiving data from a physical device to a Human Machine Interface (HMI);
 - ascertaining formatting requirements, properties, limitations, or software plug-ins associated with the physical device;
 - comparing format of the data to data formats known to the HMI;
 - determining the format of unknown data received by the HMI;
 - rendering the data in the HMI into a suitable format ~~utilizing one or more multi-dimensional objects~~ based at least in part on the properties, limitations, or software plug-ins of the physical device; and
 - mapping data path information to the received data to enable communication between the rendered data and the HMI;
- wherein rendering generates one or more multi-dimensional objects.

36. (Currently Amended) A method ~~performed at least in part by computer hardware~~ for recognizing or creating at least one software object representing at least one physical device, comprising:

employing a processor executing computer executable instructions stored on a computer readable storage medium to implement the following acts:

- mapping data path information to data delivered to the physical device to enable communication between the data and a Human Machine Interface (HMI);
- determining Input/Output (I/O) and communications protocol of the physical device;
- formatting data in accordance with the determined properties of the devices; and
- creating a software object that represents the I/O interface with the physical device.

37. (Currently Amended) A method ~~performed at least in part by computer hardware~~ for rendering data in an industrial automation environment, comprising:

means for employing a processor executing computer executable instructions stored on a computer readable storage medium to implement the following acts:

means for determining properties, limitations, or software plug-ins associated with a plurality of devices intended for delivery of data;

means for formatting data to one or more multi-dimensional objects based at least in part on the properties, limitations, or software plug-ins of the devices; and

means for delivering the formatted data to the respective devices by mapping data path information for the delivered data to the respective devices to enable communication between the data and a Human Machine Interface (HMI).

38. (Currently Amended) A method ~~performed at least in part by computer hardware~~ for rendering data in an industrial automation environment comprising:

means for employing a processor executing computer executable instructions stored on a computer readable storage medium to implement the following acts:

means for ascertaining formatting requirements, properties, limitations, or software plug-ins associated with a physical device intended for delivery of data;

means for determining whether a format of data is known to the system; and

means for determining the format of unknown data received by a Human Machine Interface (HMI);

means for rendering the data in the HMI into a suitable format ~~utilizing one or more multi-dimensional objects~~ based at least in part on the properties, limitations, or software plug-ins of the physical device; and

means for mapping data path information to data delivered to the physical device to enable communication between the data and the HMI;

wherein the means for rendering generates at least one multidimensional object.

39. (Currently Amended) A method ~~performed at least in part by computer hardware~~ for recognizing or creating at least one software object representing at least one physical device, comprising:

means for employing a processor executing computer executable instructions stored on a computer readable storage medium to implement the following acts:

means for mapping data path information to data delivered to the device to enable communication between the data and a Human Machine Interface (HMI);

means for generating at least one software object by determining properties associated with the devices intended for creation of the software objects;

means for formatting data in accordance with the determined properties of the devices;
and

means for creating the software object that represents the Input/Output (I/O) interface with the device.

40. (Currently Amended) A method ~~performed at least in part by computer hardware~~ to display data based at least in part on a zoom level, comprising:

means for employing a processor executing computer executable instructions stored on a computer readable storage medium to implement the following acts:

means for determining properties, limitations, or software plug-ins associated with a plurality of devices intended for delivery of data;

means for presenting 3-dimensional data as 2-dimensional data or vice versa based at least in part on properties, limitations, software plug-ins of the device, or any combination thereof;

means for displaying data in a plurality of disparate views; and

means for associating respective views with a corresponding zoom level.